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Developing Robust Web Application for Plagiarism Detection in Online Assessments

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ABSTRACT :

The rapid shift to online education has underscored the need for effective strategies to uphold the integrity of assessments. Traditional in-person proctoring methods face significant logistical challenges in terms of distribution, supervision, and grading, making them impractical for online education. As a result, online coding assessments have gained prominence, but ensuring their integrity remains a critical issue. The growth of online learning platforms has contributed to an increase in code plagiarism, where students replicate and modify code from peers, undermining the credibility of assessments. Detecting such instances manually is often impractical due to the sheer volume of submissions. Moreover, the pandemic has driven many organizations and institutions to rely heavily on online assessments to evaluate knowledge, prompting researchers to develop improved models for conducting these assessments. These efforts primarily focus on detecting and preventing cheating during online exams. This paper seeks to explore the challenges and advantages of various existing methodologies in this context.

Keywords: Online Assessments, Cheating, Proctoring, Behaviour

1. Introduction :

After the pandemic, many institutions and organizations have held online examinations to assess candidates' skill sets. The online assessment system encompasses various roles and outlines the type of exam to be conducted (whether subjective or objective), the duration for each examination, and the design of a user-friendly dashboard for both users and administrators. It also emphasizes the importance of secure login credentials in the online examination format. A comprehensive illustration of this setup is depicted in Figure 1 below.

In these cases, monitoring exams and observing candidates' behavior often rely on manual oversight. However, continuous monitoring on online platforms poses significant challenges, as it's difficult to observe all candidates simultaneously. Even with the implementation of robust proctoring or monitoring systems for online assessments, candidates continue to develop new methods to deceive and copy content during these exams.

1.1 Types of Cheating in Online Assessments

In the figure below, several methods are shown for deceiving and copying content during online assessments. For example, Figure 2 illustrates four different scenarios: in scenarios 1 and 3, the candidate copies content from various web pages, indicating they can open multiple tabs or websites to access information during the exam. In scenarios 2 and 4, the candidate uses additional devices, such as mobile phones or laptops, to copy content. To prevent these types of activities, various measures need to be implemented during online examinations.

Fig. 1 Overview of Online Examination

Monitoring student behavior during online assessments requires a blend of technologies and best practices to maintain the integrity of the examination process. By utilizing different tools and strategies, institutions and organizations can establish a more secure and reliable online exam environment while reducing the challenges linked to manual supervision. Below are some effective methods for monitoring student behavior during online assessments:

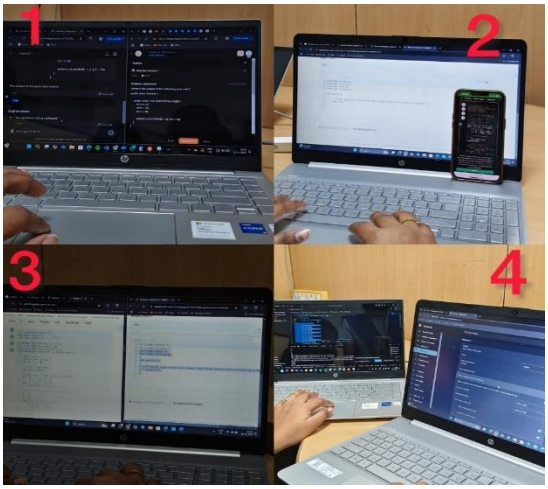

Fig. 2 - Scenarios depicts the way of copying content

- **Lockdown Browsers:** Prevents students from opening new tabs, accessing other applications, or copying and pasting during an exam.
- **Restricting Access:** Limits the use of screen-sharing tools or remote access software.
- **Webcam Monitoring:** Continuously records the student's video feed to check for suspicious movements (eye tracking, face recognition).
- **Microphone Monitoring**: Captures audio to detect background noises that might indicate unauthorized assistance.
- **Eye Tracking:** Uses camera technology to track eye movement and detect if the student is focusing away from the screen.
- **Mouse and Keyboard Tracking:** Monitors keystroke patterns and mouse activity to identify suspicious behavior
- **Facial Recognition:** Verifies that the correct student is taking the exam and continues to track their identity throughout.
- **Voice Recognition**: Confirms identity through voice verification during oral parts of an exam.

Also, there are multiple steps to prevent cheating in online assessments and that is shown in the above figure 3. Other than the above mechanism we have identified some other techniques to monitor the candidate behavior through the below mechanisms.

- **AI-Powered Proctoring:** Software that uses AI to detect unusual behavior such as looking away from the screen, multiple faces, or unauthorized materials.
- **Live Proctoring:** Involves a human proctor monitoring students in real time through video conferencing tools.
- **Recorded Proctoring:** Records the entire exam session, allowing proctors to review it later for any signs of misconduct.
- **Candidate Agreement:** Ensure students agree to honor codes or policies before starting the exam.
- **Exam Environment Check:** Require students to show their surroundings before the exam begins.

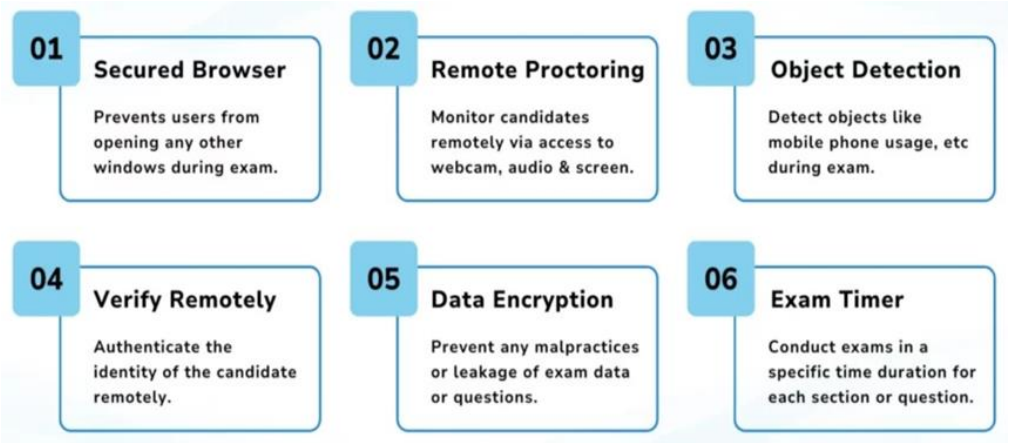

Fig 3 - Steps to Prevent Cheating in Online Examination

Despite these mechanisms, there is still a possibility for students to copy content from various sources or engage in cheating during examinations. Therefore, we need to explore novel techniques to prevent such activities.

To date, many authors have proposed various approaches to address these issues, each presenting their own methodologies. In the following chapter, we review existing methodologies and evaluate their effectiveness in addressing these challenges.

2. Analysis of Existing Methodologies :

Here we have gathered several journals that have conducted research on our connected work, and we have separately summarized each work as shown below. To date, many authors have proposed various approaches to address these issues, each presenting their own methodologies. In the following chapter, we review existing methodologies and evaluate their effectiveness in addressing these challenges.

The authors have proposed a methodology that examines the factors contributing to cheating behavior in online exams, focusing on university students' needs, perceptions, and motivations. It explores how learner-centered approaches, which prioritize student engagement, feedback, and support, can reduce cheating intentions and enhance the integrity of online assessments. The study finds that when online exams are designed to address students' needs and provide relevant feedback, students are less likely to cheat. Moreover, such designs improve the overall learning experience, foster greater engagement, and contribute to a more authentic academic environment. The paper identifies several advantages of learner-centered approaches, including reduced cheating intentions, enhanced learning experiences, and increased student engagement. However, it also acknowledges limitations, such as potential sample bias, the limitations of the assessment methods used, and the influence of cultural context on the applicability of the findings. Ultimately, the paper underscores the potential of learner-centered strategies to improve both the integrity of online assessments and students' overall academic success [1].

There is another work that explores the effectiveness of online assessments in evaluating student learning outcomes, with a focus on maintaining academic integrity, credibility, and trustworthiness within resource-constrained environments. It examines a range of techniques, including timing methods, question structuring, and online presentation strategies, to identify innovative approaches that can help preserve academic honesty while adapting to the realities of online learning. The study highlights the importance of ensuring equitable access to assessment technologies and advocates adaptive pedagogical strategies to meet the evolving needs of the educational landscape. The paper also discusses the performance of online assessments, noting that their effectiveness depends on the proper implementation of these techniques and the technological infrastructure available. While online assessments offer benefits such as flexibility, instant feedback, and reduced physical demands, challenges such as resource disparities, technical difficulties, and the potential for dishonesty continue to pose limitations to their effectiveness [2].

This paper focuses on developing a process model to detect fraudulent collaboration among students during online examinations. By leveraging learning analytics, the study analyzes student behavior, particularly submission timestamps and grades, to identify patterns that may indicate cheating or dishonest collaboration. The paper highlights concern around cheating and the need for effective monitoring in online assessments. It presents a model that uses learning environment logs, such as timestamps, to detect potential fraudulent behavior. The analysis found that submission patterns, such as the timing of answers, suggested some students may have benefited from repeated questions, reinforcing the importance of robust assessment methods. The paper also discusses the advantages of using technology, specifically the Py-Cheat tool, to enhance the monitoring and evaluation process, offering a framework for transitioning from traditional face-to-face assessments to online formats while maintaining educational standards. However, the study acknowledges limitations, such as the reliance on submission times and grades to detect cheating, which may not capture all forms of dishonest behavior, particularly those occurring outside the learning management system (LMS). Additionally, the use of repeated questions, while helpful in detecting cheating, may not align with best practices for assessment design [3].

Chavan et al., have developed an efficient and user-friendly system for detecting plagiarism using advanced machine learning techniques. The system employs methods like ‘word2vec’ and ‘cosine similarity’ to analyze text files and generate a similarity score, quantifying the degree of similarity between two pieces of text. It is designed to handle various content types, including both text and speech-based data. The study demonstrates the system's effective performance, highlighting key features such as the generation of a similarity score, which enhances the detection process. Additionally, the system utilizes advanced methodologies such as Recurrent Neural Networks (RNN) and word2vec for semantic analysis, which contribute to improved accuracy in detection in plagiarism. The system is also user-friendly, requiring minimal instructions or training for operation. The use of machine learning enables the system to quickly process and analyze text files, significantly reducing the time needed for manual plagiarism checks. However, the system does have limitations, including its requirement that input files be in text format (.txt), preventing direct analysis of formats like PDFs or Word documents. Furthermore, the system primarily detects similarities based on word usage and patterns, which may not be effective for identifying instances of paraphrasing or the use of synonyms [4].

The authors have started an investigation on academic cheating in online assessments, drawing on the experiences of language teachers to identify various contributing factors to cheating behaviors. These factors include influences from learners, educational systems, online environments, teachers, and parents. The study proposes strategies to mitigate cheating by enhancing assessment design, improving security measures, maintaining academic integrity, and providing better support for teachers. The paper also discusses the broader implications of academic dishonesty for both education and society. Key advantages highlighted include the ability to detect and prevent cheating by analyzing behavioral patterns and providing visual cues to proctors, thereby ensuring the integrity of online exams. Additionally, the paper emphasizes the enhancement of privacy and security in Internet of Medical Things (IoMT) systems using technologies like edge cloudlets and blockchain, which strengthen the reliability and trust in online service provision. The proposed system also incorporates a decentralized trust-management scheme based on past interactions with IoMT devices, further bolstering the security infrastructure. However, the study acknowledges several limitations, such as a limited participant selection, which may reduce the generalizability of the findings and overlook diverse perspectives. It also notes that there was insufficient exploration of how ethical instructions and critical thinking influence cheating behaviors, pointing to gaps in understanding the root causes. Furthermore, the paper raises concerns about the

unvalidated effectiveness of the proposed proctoring system and highlights ongoing debates surrounding remote proctoring, indicating the need for further research and validation to establish the system's reliability [5].

Newton, P. M., & Essex, K. have proposed a work that explores the prevalence of cheating in online exams among higher education students by comparing self-reported data with objective measures, and it evaluates the reliability of self-reporting as a method of data collection. The study investigates the effectiveness of various anti-cheating strategies, including traps and proctoring systems, in detecting and preventing cheating. Additionally, the paper examines the impact of data collection timeframes, and the challenges involved in accurately detecting and addressing cheating behaviors. By analyzing these factors, the paper aims to contribute to the development of more effective anti-cheating strategies for online assessments. The study provides valuable insights into the prevalence of cheating by comparing self-reported data with objective measures, which enhances the reliability of assessments. It also discusses the effectiveness of proctoring systems and traps in preventing cheating, guiding the design of future anti-cheating strategies. Furthermore, the paper highlights the challenges of interpreting data from small convenience samples and addresses the issue of underreporting, particularly due to low survey response rates and the lack of anonymity, which can lead to an underestimation of cheating rates. Finally, the study underscores the difficulty in distinguishing between students' intent to cheat and actual cheating behaviors, which can affect the accuracy and reliability of findings regarding online exam misconduct [6].

Ferdosi et al., have presented the development of an online proctoring system designed for pen-and-paper exams, aiming to detect and prevent cheating while ensuring student comfort. The system uses a lightweight, video-based machine learning model that leverages basic webcam technology to monitor facial movements such as head, eye, and lip movements. By analyzing these movements, the system helps maintain academic integrity during online exams without collecting excessive data. One of the key advantages of this system is its efficient detection of cheating behaviors, as it can analyze real-time facial movements to identify potential misconduct. Additionally, the system allows for the prevention of cheating by enabling proctors to intervene in real time based on the detected behavior. The system is designed to ensure student comfort while still upholding the integrity of the exam process. It requires only basic equipment, such as a PC or laptop and a webcam, making it easily accessible and affordable for a wide range of educational institutions. The real-time monitoring feature enhances exam security by providing immediate oversight of student behavior.
However, the paper also acknowledges several limitations of the proposed system. First, the system lacks an authentication module, which could pose risks in verifying the identity of examinees. Additionally, it is limited to using webcam videos from PCs or laptops, excluding mobile cameras, which could restrict its applicability in environments where mobile devices are used. Furthermore, the system may produce false positives, particularly for students with conditions like ADHD, who may exhibit frequent head or eye movements. It also has the potential for false negatives, where subtle cheating behaviors may go undetected. Despite these limitations, the paper provides a foundation for further development in the field of online proctoring, offering a promising solution for maintaining exam integrity with minimal technological requirements [7].

Chan, J. C., & Ahn, D. evaluates the validity of un-proctored online exams by comparing student scores with those from in-person exams. It examines several factors that might influence exam outcomes, including question types, course level, and exam duration. The paper also addresses concerns regarding cheating in online assessments, particularly in the context of the COVID-19 pandemic, and investigates whether there is any score inflation in online exams compared to traditional in-person exams. The study aims to assess whether un-proctored online exams can maintain the same level of reliability and validity as in-person assessments under unique conditions, such as the pandemic. By analyzing factors like question types and course level, the paper seeks to enhance understanding of how these elements affect exam scores and contribute to score correlations. Additionally, it explores the potential for score inflation in online assessments, which could be indicative of cheating or other factors influencing student performance. However, the study has some limitations. First, it was conducted during the COVID-19 pandemic, which limits the generalizability of the findings to typical, non-pandemic exam conditions. The rapid transition to online instruction during the pandemic may have affected the quality of exam administration, potentially influencing exam results. Furthermore, the paper acknowledges that comparing online and in-person exam formats may overlook the role of differing instructional methods in shaping student performance. These factors highlight the need for further research to better understand the long-term validity of online assessments and their ability to maintain academic integrity [8].

Lee, T. Y., & Aslam, I. analyzes assessment techniques in online exams, focusing on their roles in promoting academic integrity and fairness in student performance. It discusses three primary methods: time limitations, webcam monitoring, and flexibility in assessment formats. Time limitations are used to reduce the chances of cheating by limiting the duration of exams, though they may increase student anxiety and limit comprehensive assessment. Webcam monitoring seeks to deter dishonesty by supervising students, yet it raises privacy concerns and does not fully prevent cheating. Flexibility in assessment formats, especially prevalent during the pandemic, allows exams to be taken remotely in varied formats, accommodating diverse learning styles but also increasing opportunities for cheating through access to external resources. The paper suggests that while these methods have potential benefits, they also introduce challenges, such as heightened stress, performance variability, and new cheating strategies, calling for further research to develop fair and effective online assessment practices [9].

The authors have come with an analysis work that addressed academic integrity in online exams, focusing on two studies that explore techniques to minimize cheating and examine student attitudes. The first study, "Policy Review: Academic Cheating in Online Examinations during the COVID-19 Pandemic" by Tsorng-Yeh Lee and Irfan Aslam, discusses methods like time limitations and webcam monitoring to reduce cheating opportunities. Time restrictions aim to limit students' ability to look up answers, while webcam monitoring deters dishonest behavior through surveillance. While these techniques promote integrity, they also create challenges such as student discomfort and evolving cheating tactics, with some students unexpectedly performing better in online exams. The second study, "The Temptation to Cheat in Online Exams" by Michael Henderson and colleagues, uses anonymous surveys to gather student insights on cheating attitudes, categorizing them into cheaters, tempted, and non-tempted groups to reveal nuanced patterns of academic integrity. Although self-reported data poses limitations, these attitudes may predict cheating behavior across cohorts. Together, these studies highlight the complexities of maintaining academic integrity online, suggesting the need for balanced, evidence-based strategies that consider student well-being, performance variability, and the shifting nature of cheating in digital assessments [10].

Tight, M. explores another analysis work on various strategies to combat cheating in higher education, emphasizing the use of institutional policies, technology, and revised assessment practices. Malcolm Tight's study, "Challenging Cheating in Higher Education: A Review of Research and Practice," highlights approaches such as establishing clear policies on academic integrity, employing online proctoring and plagiarism detection tools,

and modifying assessments to limit cheating opportunities. These multi-faceted strategies provide comprehensive coverage, promote integrity awareness among students and staff, and offer adaptability to fit specific institutional needs. However, these methods are resource-intensive, have uncertain effectiveness, and may encounter resistance from students or faculty. The study concludes that, while these techniques offer potential benefits, further research is needed to determine the best practices for effectively minimizing cheating in higher education [11].

Manawar, A. have proposed a work in which Online Proctored Exams and the Integration of Technologies of Assessment in Medical Education" explains the increasing reliance on online proctoring technologies, such as ProctorExam, in high-stakes medical exams like the MRCP, particularly during the disruptions caused by the COVID-19 pandemic. It examines how these technologies—such as multiple cameras, identity verification systems, and surveillance software—ensure exam integrity by monitoring candidates remotely. However, the paper also discusses the challenges associated with these technologies, including the stress induced by constant surveillance, the potential for algorithmic bias in flagging suspicious behavior, and privacy concerns. While acknowledging the benefits of remote proctoring in maintaining fair and rigorous assessments, the authors argue that these technologies must be carefully managed to balance exam security with student well-being [12].

Fawns, T., & Schaepkens, S. P. have discussed an innovative online exam platform designed to enhance security and integrity using blockchain and AI. Blockchain is employed for secure data management, ensuring that exam content and results are protected from tampering. The platform incorporates advanced technologies like AI for face recognition, a 360-degree view, noise detection, and YOLO algorithms for real-time face detection. Additionally, SSH connections and plagiarism detection tools are included to prevent cheating and ensure fair assessments. This approach creates a secure framework for conducting exams online, but the paper also notes that the platform requires specialized infrastructure, making it computationally demanding for real-time operations. Despite these challenges, the platform improves data security and reduces cheating risks, though its performance may vary depending on system infrastructure and latency [13]. The authors have given perceptions of peer cheating behavior in online assessments during the COVID-19 pandemic explored by Roe, Perkins, Chonu, and Bhati (2023) using MANOVA for statistical analysis and qualitative thematic analysis for deeper insights. The study provides valuable information on how students view cheating in remote exams, which can help institutions enhance their academic integrity measures. However, it notes that students' perceptions may not fully align with actual cheating behavior, and variations across academic disciplines could limit the generalizability of the findings. This research offers a better understanding of student behavior and the challenges of maintaining integrity in online assessments [14].

The paper by Kaddoura and Gumaei (2023) discusses a deep learning-based approach for online exam proctoring, achieving an 87.5% success rate in identifying cheating. Their system leverages efficient cheating detection using Deep Convolutional Neural Networks (CNN) for analysing video frames from multiple camera angles and Gaussian-based Discrete Fourier Transform (DFT) for detecting cheating from speech data. The system offers adaptability and customization for students and proctors, supporting exam integrity while lacking human proctors. Limitations include the inability to detect cheating when individuals are outside of the camera's view, and challenges in maintaining exam integrity. While high accuracy is reported, specific performance metrics are not provided, indicating room for improvement in its real-time capabilities [15]. This paper says that Lee and Fanguy (2023) explore innovative techniques for online exam proctoring by combining deep learning, statistical analysis, and decision fusion to effectively detect cheating. The approach incorporates Convolutional Neural Networks (CNN), Discrete Fourier Transform (DFT), and decision fusion to analyze video and speech data, along with Visual Focus of Attention (VFOA) analysis, which tracks head pose and eye gaze to identify suspicious behavior. While the system offers practical solutions for maintaining exam integrity in remote assessments, limitations include a lack of dataset diversity, which may hinder generalizability, and the assumption of homogeneity in cheating behaviors that could lead to misclassification. The paper also highlights ethical concerns and the educational impacts of these systems, emphasizing the need for balanced and fair proctoring methods rather than focusing solely on performance metrics [16].

The authors explores the recurring nature of academic dishonesty in business education, highlighting student motivations and behaviors, while analyzing the factors contributing to these practices. It emphasizes the need for effective interventions to promote academic integrity and calls on educators to mitigate dishonest behaviors in the classroom. However, the study's limitations include a narrow focus on business education, which restricts the generalizability of its findings to other disciplines. Additionally, the reliance on self-reported data introduces potential biases and accuracy concerns. The research utilizes qualitative methods, including surveys and interviews, to gather insights into the issue [17].

Ozdamli has proposed work that was an efficient privacy provisioning enabled by decentralized blockchain technology on edge cloudlets, ensuring trustworthiness and reliability in the delivery of Internet of Medical Things (IoMT) services. It also implements a fault-tolerant system to enhance security and privacy enforcement in heterogeneous IoMT environments. However, the paper does not sufficiently address the ethical implications and privacy concerns associated with facial recognition systems in distance learning, overlooking potential issues related to student well-being and data protection. Additionally, it fails to consider biases and inaccuracies in facial emotion recognition, which could lead to unfair monitoring practices. The study employs Haar feature-based cascade classifiers for face recognition and emotion verification in its sentiment analysis system, utilizing computer vision algorithms implemented through the OpenCV library, with an emphasis on Agile for pixel-level processing [18]. Garg, M., & Goel, A. have proposed a comprehensive review of the current challenges in online assessment security, highlighting practical integrity strategies to address these issues. It serves as a valuable resource for educators and institutions aiming to enhance the security and integrity of online assessments while offering a forward-looking perspective on potential advancements. However, the paper's limitations include a focus on existing literature, which may not cover the latest technological developments in online assessment security, and a reliance on previously published sources that could introduce biases in the perspectives and strategies discussed. The paper employs a systematic literature review to assess current research on online assessment security and utilizes data analysis to identify patterns, trends, and gaps in the literature [19].

3. Comparative Analysis of existing Methodologies :

S. No.	Techniques Used	Advantages	Disadvantages / Limitations	Performance
[9]	**Time Limitation:** Shortening examination time to reduce opportunities for cheating **Webcam Monitoring:** Utilizing webcams to monitor students during online exams, although this method faced criticism from participants regarding its effectiveness	**Enhanced Integrity:** Strict time limits can help maintain academic integrity by minimizing the Adaptability The shift to online assessments allowed for flexibility in teaching and assessment methods during the pandemic	Student discomfort Evolving Cheating Strategies	**Unexpected Results:** Students performed better than expected in short-answer formats, raising questions about the impact of online learning environments on academic performance.
[10]	The paper employs a survey method to gather self-reported data from students regarding their experiences and attitudes towards cheating in online exams. This approach allows for the collection of insights into the conditions and temptations surrounding academic integrity	The anonymity and immediacy of the survey enhance the trustworthiness of the responses, as students may feel more comfortable sharing their true feelings about cheating The focus on comparing different groups (cheaters, tempted, and non-tempted) provides a nuanced understanding of academic integrity attitudes	reliance on self-reported data. to determine the actual rate of cheating,	The findings suggest that attitudes towards academic integrity can serve as predictive indicators of temptation and cheating, although they should be interpreted cautiously and used comparatively within cohorts
[11]	**Institutional Policy:** Establishing clear guidelines and consequences for cheating. Use of Technology Implementing tools like online proctoring and plagiarism detection software. Changing Assessment Practices: Modifying how assessments are conducted to reduce opportunities for cheating	**Comprehensive Coverage:** Multi-faceted approaches can address different aspects of cheating. **Increased Awareness:** Training helps foster a culture of integrity among students and staff. **Adaptability:** Techniques can be tailored to specific institutional contexts and needs	Resource Intensive Uncertain Effectiveness Potential Resistance	The effectiveness of these techniques varies, with some showing only small reductions in cheating incidents. More research is needed to determine the best practices for effectively challenging cheating in higher education
[12]	Online proctoring software (e.g., Proctor Exam), use of multiple cameras and identity verification systems.	Allows exams to be conducted remotely with integrity, despite the pandemic. Ensures continuity of high-stakes medical exams like MRCP by using online proctoring technologies.	Risk of bias, as online proctoring systems may flag suspicious behavior incorrectly.	Ensures fair assessments but may raise privacy issues and stress among students due to surveillance.
[13]	Blockchain for secure data management, AI for face recognition, 360-degree view, noise detection, YOLO algorithms for face detection, SSH connections, plagiarism detection tools.	Provides a secure framework for conducting online exams, ensuring consistency and secure questionnaire delivery from servers. It eliminates potential cheating and secures result publication.	Requires specialized infrastructure like blockchain and AI systems; computationally heavy for real-time face recognition and plagiarism checks.	Improved data security and prevention of cheating, although real-time performance depends on system infrastructure and latency.
[14]	MANOVA for statistical analysis of differences in perception, qualitative thematic analysis for deeper insights	Provides insights into students' perceptions of cheating behavior during COVID-19 online assessments, helping institutions improve academic integrity measures.	Perceptions might not reflect actual cheating behavior, and variations across disciplines may limit generalizations.	Provides a better understanding of student behavior and academic integrity challenges during online assessments.

[15]	Efficient Cheating Detection: The system achieves an 87.5% success rate in identifying cheating during online exams. Adaptability and Tolerance: The proctoring system allows customization for students and proctors while maintaining exam integrity.	Limited Cheating Detection: The system fails to detect cheating when individuals are out of the camera's view. Challenges in Exam Integrity: Lack of human proctors complicates cheating prevention in online exams.	Deep (CNN): Used for cheating detection from video frames with separate models for front and back camera angles.	High accuracy in detecting cheating instances (specific metrics not provided)
[16]	Innovative Techniques: Combines deep learning, statistics, and decision fusion for cheating detection. Effective Detection: Leverages CNN, DFT, and decision fusion for reliable detection from video and speech data.	Limited Dataset Diversity: Lack of dataset diversity may restrict generalizability. Assumed Homogeneity: Overlooks variations in individual cheating behaviors, risking misclassification.	Deep Learning and Statistical Methods: Combines techniques to enhance accuracy and robustness in cheating detection.	No specific performance metrics: focus is more on ethical concerns and impacts on education
[17]	Blockchain for secure data management, AI for face recognition, 360-degree view, noise detection, YOLO algorithms for face detection, SSH connections, plagiarism detection tools.	Provides insights into students' perceptions of cheating behavior during COVID-19 online assessments, helping institutions improve academic integrity measures.	Resource Intensive Uncertain Effectiveness potential Resistance	Ensures fair assessments but may raise privacy issues and stress among students due to surveillance.
[18]	Efficient Cheating Detection: The system achieves an 87.5% success rate in identifying cheating during online exams. Adaptability and Tolerance: The proctoring system allows customization for students and proctors while maintaining exam integrity.	Limited Cheating Detection: The system fails to detect cheating when individuals are out of the camera's view. Challenges in Exam Integrity: Lack of human proctors complicates cheating prevention in online exams.	Deep Convolutional Neural Network (CNN): Used for cheating detection from video frames with separate models for front and back camera angles. Gaussian-based Discrete Fourier Transform	Qualitative research Surveys Interviews
[19]	The paper highlights efficient privacy provisioning through decentralized blockchain technology on edge cloudlets, ensuring trustworthiness and reliability in IoMT service delivery. It also implements a fault-tolerant system that enhances security and privacy enforcement in heterogeneous IoMT environments.	The paper does not adequately explore the ethical implications and privacy concerns of facial recognition systems in distance learning, potentially overlooking issues related to student well-being and data protection. It also fails to address biases and inaccuracies in facial emotion recognition, which could lead to unfair monitoring practices.	The paper employs Haar feature-based cascade classifiers for face recognition and emotion verification within its sentiment analysis system.	Gives a better understanding of student behavior and academic integrity challenges during online exams.

4. Conclusion :

In conclusion, the online education expands, the challenge of preserving fairness and credibility in assessments becomes increasingly significant. There is a proper and innovative solution required for avoiding such types of cheating related activities. A Plagiarism based solution addresses these concerns by incorporating cutting-edge technologies. Machine learning enables complex similarity analysis, capable of identifying even subtle patterns of plagiarism, such as modified variable names or structural changes in code. This ensures that copied code is effectively flagged, promoting academic honesty. MongoDB serves as a robust and efficient data storage solution, capable of handling large volumes of code submissions while ensuring easy retrieval and management for comparisons. These components are seamlessly integrated using a FastAPI backend, which acts as the backbone of the application, coordinating interactions, enabling real-time processing, and ensuring high reliability and scalability. By automating and streamlining the plagiarism detection process, this application not only overcomes the practical challenges associated with manual methods but also ensures that evaluations remain impartial and credible. Ultimately, it fosters a trustworthy and equitable online learning environment, reinforcing the values of integrity and fairness in education.

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